

# Overview of Safety and Health Hazards for Hurricane Responders



*Adapted from “Katrina Response Orientation,” NIEHS,  
Worker Education & Training Program, 9/09/05*

## **Objectives of this training - At the end of this lesson, you should be able to:**

- Describe some of the potential health and safety hazards that you may face during rescue, response, and clean-up work after a major hurricane
- Explain some measures that you can use to protect yourself

*Adapted from “Katrina Response Orientation,” NIEHS, Worker Education & Training Program, 9/09/05*

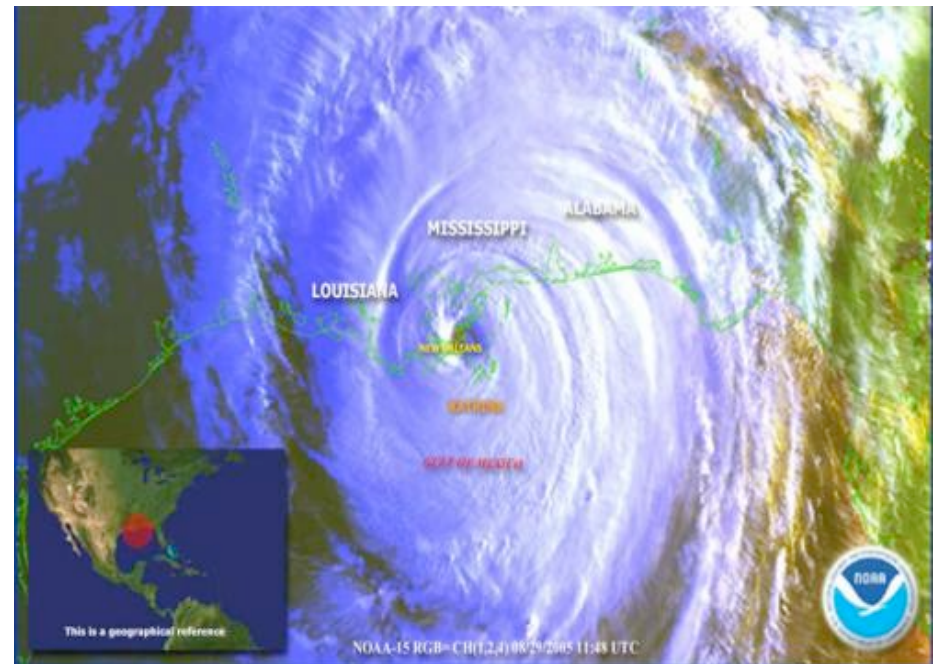
# Additional Information

- This training program is based on recommendations from NIEHS, NIOSH, OSHA, CDC and the U.S. Army
- You can find a link to fact sheets on specific hazards and other important information on the OSHA website, <http://www.osha.gov/OshDoc/hurricaneRecovery.html>

*Adapted from “Katrina Response Orientation,” NIEHS, Worker Education & Training Program, 9/09/05*

# Background

- State and federal agencies are deploying in support of hurricane relief efforts
- Environmental and occupational health hazards are a potential threat to deployed personnel



**Hurricane Katrina left the Louisiana and Mississippi coastlines in ruin. Up to 1 million people have been without power, safe food, and safe water.**

# Physical Environment

- The Land
  - Mostly flat, coastal, some areas below sea level
- The Climate
  - (September)
  - High Humidity
  - 90+° F day
  - 70° F night
  - Potential for additional storms



***Adapted from “Katrina Response Orientation,” NIEHS,  
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# Remember: Protect Yourself!

If in doubt, contact your supervisor!

- Physical injury was a top diagnosis following Hurricane Andrew
- Walking over and handling debris that is covered with water can cause cuts, scrapes, bruises, sprains, etc.
- Remain current with tetanus vaccination – revaccinate for a dirty wound if current vaccination is over 5 years old
- Consider steel toe/shank footwear if available
- If you will be performing direct patient care or otherwise expected to have contact with bodily fluids, get the Hepatitis B vaccine series

***Adapted from “Katrina Response Orientation,” NIEHS,  
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# **Hazard: Heat Stress**

## **Heat stroke is a killer**

- **Drink lots of water**
- Know the signs of heat-related illnesses
- Monitor yourself and coworkers, use the buddy-system
- Block out direct sun or other heat sources
- Use cooling fans/air-conditioning and rest regularly
- Wear lightweight, light-colored, loose-fitting clothes
- Avoid alcohol, caffeinated drinks, or heavy meals
- Get medical help for symptoms such as altered vital signs, confusion, profuse sweating, excessive fatigue
- Take shelter in shaded areas and, for fire fighters, unbutton and remove bunker gear



***Adapted from “Katrina Response Orientation,” NIEHS,  
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## **Hazard: Sunburn**

- Prevent overexposing skin and eyes to sunlight and wind
- Use sunscreen and lip balm
- Use protective eyewear
- Limit exposure



**Sunburn reduces  
responder  
readiness and  
increases the  
likelihood of skin  
cancer**

*Adapted from “Katrina Response Orientation,” NIEHS,  
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# **Hazard: Piles of Debris and Unstable Work Surfaces**

- Don't walk on surfaces you aren't sure are stable
- Use other ways to get to work surfaces, such as bucket trucks
- Erect scaffolding on stable surfaces and anchor it to stable structures
- Wear protective equipment provided, including safety shoes with slip resistant soles
- Use fall protection with lifelines tied off to suitable anchorage points, including bucket trucks, whenever possible



***Adapted from “Katrina Response Orientation,” NIEHS,  
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# **Hazard: Electrical, Overhead Power Lines, Downed Electrical Wires, Cables**

- Treat all power lines as energized until they have been de-energized and tested
- Verifying that a line is not energized may not ensure your safety. Lines on both the load and supply sides of the work area must be grounded. Grounding is necessary to protect you from the hazards of feedback electrical energy from a secondary power source, such as a portable generator

*Adapted from “Katrina Response Orientation,” NIEHS, Worker Education & Training Program, 9/09/05*

# **Hazard:** Handling a Variety of Sharp, Jagged Materials

- Wear personal protective equipment, including hard hats, safety shoes, eye glasses, and work gloves
- Immediately clean out all open wounds and cuts with soap and clean water. Apply an antibiotic ointment to discourage infection. Contact a doctor to find out whether more treatment is needed (such as a tetanus shot). If a wound gets red, swells, or oozes, seek immediate medical attention
- Make sure that you have an up-to-date tetanus shot (within the past 10 years)



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# Hazard: Operating a Chain Saw

- **Operate, adjust, and maintain the saw according to manufacturer's instructions** provided in the manual accompanying the chain saw
- **Properly sharpen chain saw blades and properly lubricate the blade** with bar and chain oil. Additionally, the operator should periodically check and adjust the tension of the chain saw blade to ensure good cutting action
- **Choose the proper size of chain saw to match the job**, and include safety features such as a chain brake, front and rear hand guards, stop switch, chain catcher and a spark arrester
- **Wear the appropriate protective equipment**, including hard hat, safety glasses, hearing protection, heavy work gloves, cut-resistant legwear (chain saw chaps) that extend from the waist to the top of the foot, and boots which cover the ankle
- **Avoid contact with power lines** until the lines are verified as being de-energized
- **Always cut at waist level or below** to ensure that you maintain secure control over the chain saw
- **Bystanders or coworkers should remain at least 2 tree lengths (at least 150 feet) away** from anyone felling a tree and at least 30 feet from anyone operating a chain saw to remove limbs or cut a fallen tree

*Adapted from "Katrina Response Orientation," NIEHS,  
Worker Education & Training Program, 9/09/05*

# Hazard: Eye Injuries

Eye injuries can be caused by dust, flying debris and welding flash

- Use safety glasses with side shields as a minimum. An eye wear retainer strap is suggested
- Consider safety goggles for protection from fine dust particles, or for use over regular prescription eye glasses
- Light from a welding torch can cause severe burns to the eyes and surrounding tissue. Any worker using a welding torch for cutting needs, or anyone working near a welding torch, should use special eye wear for protection from welding light
- Only use protective eyewear that has an ANSI Z87 mark on the lenses or frames



Non-prescription



prescription



***Adapted from “Katrina Response Orientation,” NIEHS,  
Worker Education & Training Program, 9/09/05***



# **Hazard:** Heavy Equipment, Including Cranes, Bucket Trucks, Skid-Steer Loaders

- Operate equipment correctly and safely
- Stay aware of the activities around you
- Do not exceed the load capacity of cranes and other lifting equipment
- Do not walk under or through areas where cranes and other heavy equipment are being used to lift objects
- Do not climb onto or ride loads being lifted or moved

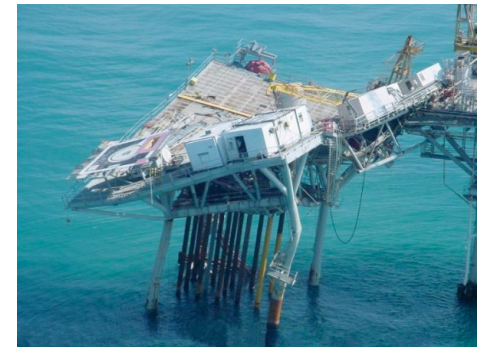


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# **Hazard: Chemicals Released by Katrina**

- Chlorine tank found in downtown Gulfport
- 78,000 barrels of oil released at two spills
- Diesel, gasoline, motor oil, chlorine, liquid oxygen, medical waste and corrosives have been found by crews
- 22,000 facilities in the area have underground fuel tanks



*Adapted from “Katrina Response Orientation,” NIEHS,  
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# **Hazard: Potential Chemical Exposures**

Symptoms: Eye, nose, throat, upper respiratory tract, and skin irritation; flu like symptoms; difficulty breathing; fatigue; loss of coordination; memory difficulties; sleeplessness; mental confusion. Chronic effects depend on the extent and the duration of exposure

- Fire Fighting: Use self Contained Breathing Apparatus (SCBA) with full face piece in pressure demand or other positive pressure mode
- Entry into unknown concentration: Use SCBA gear
- Rescue operations with vapors present: Use gas mask with front mounted organic vapor canister (OVC) or any chemical cartridge respirator with an organic vapor cartridge
- Dusty environments: Use combination HEPA/Organic Vapor Cartridge

***Adapted from “Katrina Response Orientation,” NIEHS,  
Worker Education & Training Program, 9/09/05***

# Hazard: Breathing Dust Containing Asbestos, Silica and Other Toxins

- Protect yourself from breathing dust, it can contain toxic materials
- **If in doubt about respirators, see your supervisor**
- An N-95 or greater respirator is acceptable for most activities, including silica and portland cement dust
- If asbestos is present, use a half-mask elastomeric respirator with N,R, or P-100 series filters
- If airborne contaminants are causing eye irritation, full-face respirators with P-100 organic vapor/acid gas (OV/AG) combination cartridges should be used
- Make sure you are fit-tested for a respirator, it must fit properly to protect you
- Surgical masks should **not** be used because they do not provide adequate protection



N-95 Respirator

*Adapted from “Katrina Response Orientation,” NIEHS,  
Worker Education & Training Program, 9/09/05*

# **Hazard:** Carbon Monoxide from Gasoline- or Propane-Powered Generators or Heavy Machinery

**Symptoms:** Headache, dizziness, drowsiness, or nausea; progressing to vomiting, loss of consciousness, and collapse, coma or death under prolonged or high exposures.

- Use CO warning sensors when using or working around combustion sources
- Shut off engine immediately if symptoms of exposure appear
- Do not use gasoline generators or portable fuel driven tools in confined spaces or poorly ventilated areas
- Do not work in areas near exhaust (CO poisoning occurs even outdoors if engines generate high concentrations of CO and worker is in the area of the exhaust gases). With symptoms of exposure, shut off the engine

***Adapted from “Katrina Response Orientation,” NIEHS, Worker Education & Training Program, 9/09/05***

# Hazard: Confined Spaces

The following must be done before you enter a confined space. Your supervisor must:

- Ventilate and monitor for hazardous conditions
- Lock out or tag out all power equipment in the space
- Issue appropriate PPE, possibly including self-contained breathing apparatus (SCBA)
- Establish barriers to external traffic such as vehicles and pedestrians
- Provide ladders or similar equipment for safe entry and exit in the space
- Provide good communications equipment and alarm systems
- Have rescue equipment nearby



***Adapted from “Katrina Response Orientation,” NIEHS,  
Worker Education & Training Program, 9/09/05***

# **Hazard: Too Much Noise**

- Use hearing protection whenever noisy equipment is used
- Examples: saws, earth-moving equipment, Hurst tools
- Hearing protection will prevent temporary hearing loss that can interfere when listening for cries, moans, and other sounds from victims buried in the rubble



*Adapted from “Katrina Response Orientation,” NIEHS,  
Worker Education & Training Program, 9/09/05*



# Hazard: Standing Water

- EPA has found elevated levels of contamination associated with raw sewage and other hazardous substances in the flood waters in New Orleans
- The EPA advises that human contact with water should be avoided
- Workers should wear waders and waterproof gloves when coming into contact with flood water
- If clothes come into contact with flood water, wash them in water and detergent separately from uncontaminated clothes and linens
- If skin comes into contact with flood water, wash thoroughly with soap and water
- If you have any open cuts or sores that will be exposed to floodwater, keep them as clean as possible by washing them with soap and applying an antibiotic ointment to discourage infection
- Make sure flood water does not get in your mouth



Waders

***Adapted from “Katrina Response Orientation,” NIEHS,  
Worker Education & Training Program, 9/09/05***

# **Hazard: Fungal Skin Infections**

Protect your feet by:

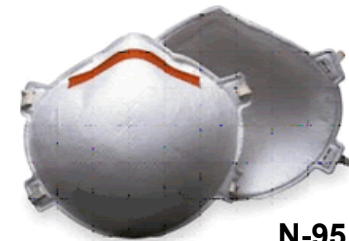
- Keeping feet clean and dry
- Change socks at least every 8 hours or whenever wet and apply foot powder
- Bring extra boots - alternate boots from day to day to allow boots to dry
- Seek medical care at the first sign of any problems

*Adapted from “Katrina Response Orientation,” NIEHS,  
Worker Education & Training Program, 9/09/05*

# Hazard: Mold

After hurricanes and floods, the water creates the perfect environment for mold to grow in homes and other buildings. Exposure to mold can cause wheezing and severe nasal, eye and skin irritation.

- Avoid breathing dust (fungal spores) generated by wet building materials
- Use an N-95 NIOSH-approved disposable respirator as a minimum when working with moldy or damp materials
- Wear long gloves that reach the middle of your forearm. If you are using a disinfectant, a biocide such as chlorine bleach, or a strong cleaning solution, you should select gloves made from natural rubber, neoprene, nitrile, polyurethane, or PVC. Avoid touching mold or moldy items with your bare hands



**N-95  
Respirator**



**N-95 Respirator  
with exhalation  
valve**

***Adapted from “Katrina Response Orientation,” NIEHS,  
Worker Education & Training Program, 9/09/05***

## Hazard: Mold (cont'd)

- Wear goggles that do not have ventilation holes. Avoid getting mold or mold spores in your eyes
- Consider discarding all water-damaged materials. Articles that have visible mold should be thrown away. **When in doubt, throw it out**
- After working with mold-contaminated materials, wash thoroughly, including your hair, scalp, and nails

*Adapted from “Katrina Response Orientation,” NIEHS,  
Worker Education & Training Program, 9/09/05*

# **Hazard: Bloodborne Disease**

- Use impervious gloves when handling human remains
- Replace gloves if punctured or torn
- Do not handle human remains if you have skin cuts or punctures
- Use goggles or face shield and mask for handling human remains, recovering deceased. Make sure to cover your nose and mouth
- Transport human remains in closed, leak-proof, labeled containers

*Adapted from “Katrina Response Orientation,” NIEHS, Worker Education & Training Program, 9/09/05*

# **Hazard: Handling Bodies of Victims**

- Although infectious diseases are rarely contracted from contact with a corpse, response personnel should use care in handling dead bodies
- Increased number of filth flies can increase shigellosis.
- **For personnel exposed to blood and body fluids:**
  - Use gloves when handling bodies or body fluids
  - Use eye protection, gowns, and masks when large quantities or splashes of blood are anticipated
  - Wash hands frequently
  - Use body bags to reduce the risk of contamination

***Adapted from “Katrina Response Orientation,” NIEHS,  
Worker Education & Training Program, 9/09/05***



# Hazard: Animals and Insects

- **To protect yourself from mosquitoes**, use screens on dwellings, and wear long pants, socks, and long-sleeved shirts. Use insect repellents that contain DEET or Picaridin. (Make sure you follow the directions written on the label.)
- **To assist in controlling mosquito populations**, drain all standing water that you may encounter in open containers, such as flower pots, tires, pet dishes, or buckets
- **Beware of wild or stray animals**. Avoid wild or stray animals. Call proper authorities to handle animals. Get rid of dead animals according to guidelines. Wear and clean proper protective clothing when handling carcasses
- **Be on the alert for snakes** that may be hiding in unusual places after flooding. If you are bitten, try to identify the snake so that if it is poisonous, you can be given the correct antivenin. Do not cut the wound or attempt to suck the venom out. Contact your local emergency department for further care

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# **Hazard: Foodborne Disease**

- **Identify and throw away food that may not be safe to eat**
  - Be sure to know the source of the food that you eat
  - Do not eat food provided by unauthorized cooks or volunteers who show up at your worksite with treats
  - Food containers with screw-caps, snap-lids, crimped caps (soda pop bottles), twist caps, flip tops, snap-open, and home canned foods should not be consumed if they have come into contact with floodwater because they cannot be disinfected
- **Store food safely**
  - If your accommodations lack refrigeration, do not store perishable food

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Worker Education & Training Program, 9/09/05*

# Hazard: Waterborne Disease

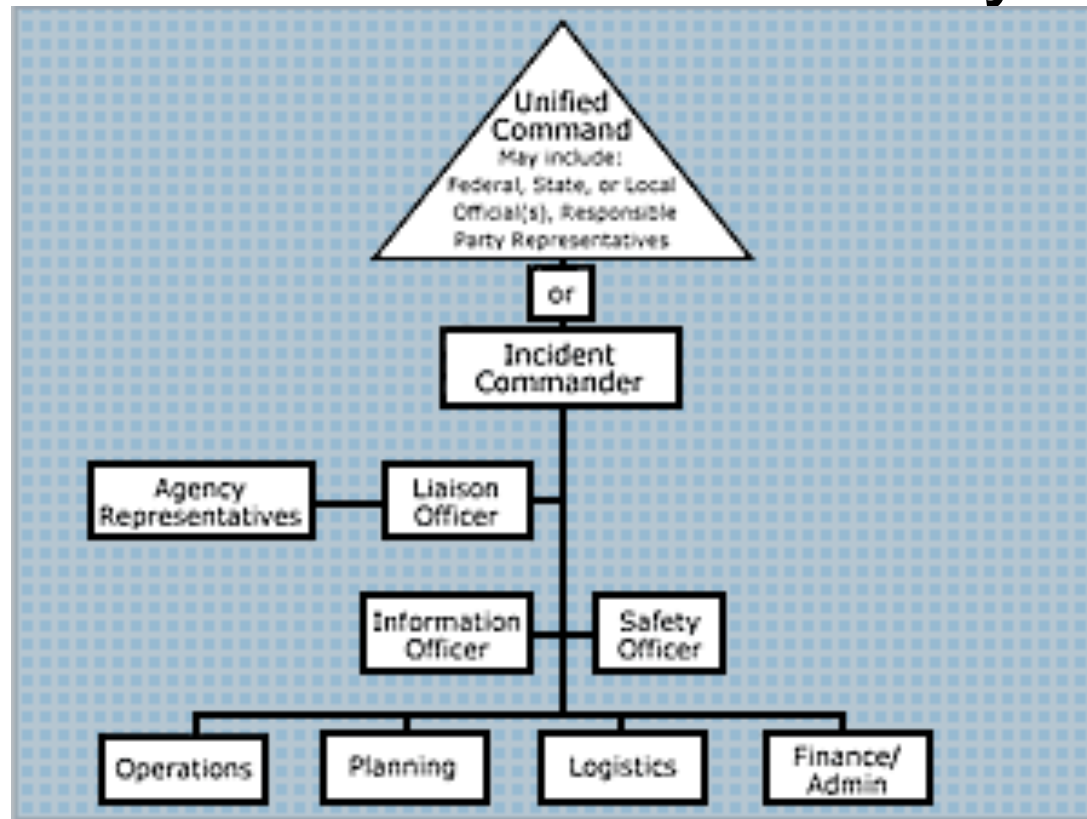
- Listen to and follow public announcements
- Local authorities will tell you if tap water is safe to drink or to use for cooking or bathing
- If the water is not safe to use, follow local instructions to use bottled water or to boil or disinfect water for cooking, cleaning, or bathing.
- Wash Your Hands often



*Adapted from "Katrina Response Orientation," NIEHS,  
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# Other Protective Measures

- Follow the Incident Command System



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Worker Education & Training Program, 9/09/05*

# Other Protective Measures

## Key items to have

- Insect repellant with Deet or Picaridin
- Water life vest
- Earplugs
- Bottled water
- Sun screen
- Rain Gear
- Pocket Knife (put in your checked luggage)

**For more information, call 1-800-321-OSHA or log onto [www.osha.gov](http://www.osha.gov)**

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# Other Protective Measures— Personal Protective Equipment

Remember:

- The type of personal protective equipment you need depends on the hazards of the job you do and where you do the work
- You must check personal protective equipment for defects before you use *it—every time!*

For information on what equipment you need, contact your local OSHA office or NIOSH

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Worker Education & Training Program, 9/09/05*



# Credits

The NIEHS presentation from which this was adapted was based on

- a NIOSH Guide called “Suggested Guidance for Supervisors at Disaster Rescue Sites.” More information is available at their site:  
<http://www.cdc.gov/niosh/emhaz2.html>
- CDC web site entitled “Hurricanes, what you should know”  
<http://www.bt.cdc.gov/disasters/hurricanes/index.asp>
- U.S. Army Center for Health Promotion and Preventive Medicine PowerPoint:  
<http://chppm-www.apgea.army.mil/news/PMMforKatrina.ppt>

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